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CONTENTS

Lyman—Effect of temperature on the emergence of mayflies 113

Ross—Onthophilus kirni and other Histeridae from burrows of a Texas Pocket-Gopher 115

Garth—Butterflies of the Organ Pipe Cactus National Monument, Arizona 119

Alexander—Undescribed crane-flies from U. S. and Canada 125

Cartwright—New Aphodius from Texas gopher burrows 129

Notes and News in Entomology 135

Entomological Literature 138

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Effect of Temperature on the Emergence of Mayfly Imagoes from the Subimago Stage [1]

By F. EARLE LYMAN, Norris, Tennessee

While rearing a series of adult specimens of certain mayfly species from mature nymphs to the adult stage under circumstances closely simulating natural conditions, the normal length of the subimago stage was determined as approximately 24 hours for both sexes of each of the species considered. However, as the rearing was carried on out of doors, it was further observed that this 24-hour interval was materially lengthened by a period of cool weather. Clemens (1915) recorded that the length of the subimago period for laboratory-reared specimens of *Stenonema tripunctatum* (Banks) is generally one day, but in the early part of the season, it may last 3–4 days. He also stated "no doubt this time would have been shortened had the subimagoes been out of doors." He did not give his reason for believing this, but in an earlier paper (1913) he mentioned that temperature and humidity seemed to be factors in determining the duration of the subimago stage. While humidity seems to be a significant factor that may determine in general the success or failure of the subimaginal molting process, it may be pointed out that concrete experimental evidence is lacking as to its exact role in the transformation of subimago to imago. The purpose of this writing is to direct attention toward the effect of temperature on the length of the subimago period; it is not an attempt to settle the question of the effect of humidity

[1] Contribution from the Biological Station and Department of Zoology, University of Michigan.

differences on the life of the subimago. Preliminary experimental evidence is given below to support the contention that temperature is definitely a controlling factor which determines the length of the subimago stage and that humidity is probably a minor factor.

To study the influence of temperature upon the length of the subimago period, several subimagoes of both sexes of *S. femoratum* (Say) were placed in a glass jar with an inner screen-wire lining and perforated top. This jar was then placed in a refrigerator regulated at an average temperature of 7.2° C. Soon after being placed in the cold, the subimagoes became inactive and ceased practically all movement during the entire time at this temperature, although they retained their normal vertical position on the wire screen. None of the specimens had emerged after 130 hours, at which time they were removed from the cold. All individuals were apparently in good condition, for they emerged successfully within 12 hours under the prevailing air-temperature conditions of mid-summer (25.0° C.–30.0° C.).

A number of other specimens were collected as they emerged from their nymphal skins during the evening and were immediately placed in the glass jar described above. The jar was then submerged, except for the perforated cover, into an aquarium provided with a steady flow of cold water. The air temperature within the jar remained at 16.7° C. throughout the duration of the experiment. The length of the subimago period under these conditions lasted for about 48 hours while other specimens collected as subimagoes at the same time and maintained as controls during the same period under the higher prevailing air temperatures and under similar conditions of humidity emerged in about 24 hours.

Individuals of *S. interpunctatum* (Say), *Ephemerella bicolor* Clemens, and *E. temporalis* McDunnough which normally also have a subimaginal period of 24 hours were subjected to experimental conditions as described above with similar results.

While temperatures were varied and humidity remained more or less constant during the experiments, it seems evident that temperature is an important factor determining the length of

the subimago period. Since the life-span of the adult mayfly is relatively short and swarming for most species can best be carried out during periods of warm, fair weather, it is a distinct advantage to the mayfly to have its aerial existence prolonged so as to tide it over times of cold, inclement weather. It has been noted that unusually large swarms of *Hexagenia* follow an interval of cool, windy, and rainy weather.

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Clemens, W. A. 1913. New species and life histories of Ephemeridae or Mayflies. Can. Ent., 45: 246–262.

Clemens, W. A. 1915. Life histories of Georgian Bay Ephemeridae of genus *Heptagenia*. Suppl. 47th Ann. Rept. Dept. Marine and Fish., Fish. Branch. Cont. Can. Biol. Fasc. II, 131–133.

Onthophilus kirni New Species, and Two Other Noteworthy Histeridae from Burrows of a Texas Pocket-Gopher

By Edward S. Ross, California Academy of Sciences

The following Histeridae were collected in burrows of *Geomys breviceps attwateri* in Central Texas in the manner outlined in the foregoing paper.

Abraeinae

Onthophilus kirni new species

Holotype male.—Elongate oval, robust, convex, black, shining. Head punctate throughout, punctures dense and confluent, especially in clypeal region, interspaces rugose; surface without striae, carinae, or ridges.

Pronotum not continuous in outline with elytra; sides very broadly, obtusely angulate, somewhat rounded; lateral bead prominent with a deep inner groove along entire length of side, deepest at anterior angle and extended for a short distance mesad along anterior margin which is very shallowly emargi-

nated, nearly straight; surface evenly, weakly convex; punctate throughout, the punctures irregular in shape and size—smallest on disk, largest and densest laterally, interspaces shiny; disk without longitudinal ridges or carinae; with a very prominent, deep groove at lateral fourth, nearest sides at base, and extending to apical third, arcuate, outer margin of groove most abrupt, shining.

Elytra narrow behind, with two prominent, deep fossae at basal margin just within mesal half; surface continuous with that of pronotum, not inflated, with rather uniform, longitudinal carinae—seven larger, broader, shiny carinae with three or four lesser ones between; the grooves scarcely crenulate or fossate except distad; subhumeral stria very deep, broad, sinuous, deeply fossate; area between this stria and margin with large, shallow, disk-like punctation in apical half. Propygidium quadrate, one-third broader than long; with a rounded, longitudinal, medial elevation; punctation coarse, irregular, especially across base and on sides, very fine at vertex of elevation. Pygidium elongate, little less than twice as long as wide; surface without ridges, rather smooth except for two shallow, sublateral impressions near basal margin; coarsely, irregularly punctate, interspaces shining.

Prosternum broad, flat, obtusely emarginated at base; punctuation fine, sparse, with larger punctures interspersed with finer ones. "Mesosternum" with punctures deep, sparse. "Metasternum" rather impressed along median longitudinal suture; punctures evenly spaced, deep with micropunctures in interspaces. Pterothoracic pleurites with broad, disc-like, shallow, nearly contiguous punctures.

Protibiae slender with eight spicules, each on an elevated base.

Length (anterior pronotal margin to apex of elytra), 3.0 mm.

Allotype female.—Very similar to male but somewhat broader with the head and pronotum more sparsely punctate, the "metasternum" not depressed, and the protibial denticules larger, more numerous and extended nearly to base.

Length, 3.1 mm.

Holotype and allotype.—Collected in a bait trap in a *Geomys* burrow, seven and one-half miles S. E. Somerset, TEXAS (near San Antonio); February 18, 1943 (A. J. Kirn); [California Academy of Sciences].

Paratypes.—Numerous males and females collected at the above locality in bait traps and by excavating *Geomys* burrows by A. J. Kirn and the writer.

These specimens will be distributed among the major insect collections in this country.

Kirni is separated at once from all other North American *Onthophilus* by its prominent, basal, elytral fossae and small, deep punctuation of the "sternal" plates. All other species of the genus have very broad, disc-like, shallow punctures on these plates. It, and its allies, *lecontei* Horn * and *soltaui* Casey † form a natural group of species characterized by the simplicity of the elytral carinae and the development of the sublateral pronotal grooves. *Lecontei* and *soltaui* are very similar to one another if not conspecific. I have seen specimens of the former from California which have pronotal grooves very similar to those of the holotype of *soltaui,* although the reduction of these grooves is characteristic of most California specimens. A series of specimens from Colorado may reveal that this variation may also occur in *soltaui.*

Kirni was encountered in large numbers in the nest chamber of *Geomys breviceps attwateri.* As many as nineteen specimens were found in one nest and 115 specimens were collected in all, counting those obtained in bait traps. This appears to be the normal habitat of the *kirni* and, in view of their rarity, animal burrows may likewise be the true habitat of *soltaui* and *lecontei.* Indeed, a small series of the latter species was collected in *Thonomys* burrows at Atascadero, California, February 8, 1940, by J. W. Tilden. Only a few specimens of this species had previously been captured in all the years it has been known.

* Trans. Amer. Ent. Soc., III, p. 138, 1870; type locality, Ft. Tejon, Calif.

† Ann. New York Acad. Sci., VII, p. 557, 1893; type locality, Denver, Colo.

Saprininae

Geomysaprinus goffi Ross

Geomysaprinus goffi Ross, 1940, Ann. Ent. Soc. Amer., XXXIII, p. 3, fig. 1, 1940. [Type locality: Leesburg, Fla.; in a *Geomys* burrow.]

Forty specimens of this species were collected near Somerset, Texas in bait traps and nest chambers of the *Geomys* during December, January and February. Except for their consistently smaller size, they appear to be very similar to the Florida specimens. The species may be expected to occur throughout the range of *Geomys* in the United States.

It should be noted here that *Saprinus rugosifrons* Fall* is actually a *Geomysaprinus* and is closely related to *goffi* but separable by the much stronger punctuation of pronotum and elytra. Since the type was collected apparently far north of the range of *Geomys, Geomysaprinus* may be encountered in burrows made by other animals.

Histerinae

Spilodiscus gloveri (Horn)

Hister gloveri Horn, Trans. Amer. Ent. Soc., III, p. 135, 1870. [Type locality: Ft. Cobb, Indian Territory (Oklahoma).]

Until Mr. Kirn and the writer collected eleven specimens of this species in *Geomys* burrows near Somerset, Texas, it apparently had not been collected since it was described from a unique specimen seventy-three years ago. *Spilodiscus floridanus* Ross (1940, p. 7) from Florida *Geomys* burrows is very similar to *gloveri* and probably will prove to be only a subspecies of it. *Floridanus* appears to differ in that the third dorsal elytral stria is consistently abbreviated apically. In the eleven specimens of *gloveri* this stria is always complete to the elytral apex.

Reference

Ross, E. S. 1940, New Histeridae (Coleoptera) from the burrows of the Florida pocket gopher. Ann. Ent. Soc. Amer., XXXIII, pp. 1–9, 5 figs.

* Can. Ent., LI, p. 213, 1919; type locality, Aweme, Manitoba.

Butterflies of the Organ Pipe Cactus National Monument, Arizona

By JOHN S. GARTH

In April, 1942, four staff members of the Allan Hancock Foundation of the University of Southern California made a preliminary biological survey of a portion of the Organ Pipe Cactus National Monument, which borders on the Mexican state of Sonora midway between Yuma and Nogales, Arizona. The party was joined at Ajo by Dr. Ernest R. Tinkham of the Arizona Game and Fish Commission, who with the writer explored Alamo Canyon and the spur of the Ajo Mountains which forms its southern rim. The following species of diurnal Lepidoptera were taken or observed on April 19 and 20. Because of the extreme ruggedness of terrain, density of plant cover, and lack of trails, not all species seen could be netted. Observations on which both collectors concurred are included because of the paucity of records from this part of Arizona. The nomenclature is according to the McDunnough check-list of 1938. Plants were determined by Dr. Norman C. Cooper, party botanist, from specimens collected by Dr. Tinkham at the same time.

Papilio philenor L.

A single ♀ specimen was taken on the south side of Alamo Canyon.

Papilio daunus Bdv.

Several individuals believed to be of this species were seen flying up the steep canyons which are tributary to Alamo Canyon. Because of the heavy growth of California Rosewood (*Vaquilinea californica*), barberry (*Berberis trifoliata*), and associated shrubs, these vigorous fliers kept well out of net's reach.

Zerene caesonia Stoll.

A single specimen was observed in rapid flight just below the "waterfall" (dry at the time of our visit). Since the species ranges westward into Riverside County, California, it is to be expected to occur throughout southern Arizona.

Eurema nicippe Cram.

One ♀ specimen was netted of many seen fluttering over a large residual pool at the base of the dry waterfall mentioned above. The green moss which covered the water was a favorite resting place for the insects but afforded poor footing indeed for the collector!

Eurema mexicana Bdv.

Specimens of this species were observed flying with *nicippe*, but none were taken.

Nathalis iole Bdv.

One ♂ specimen of this ubiquitous species was taken at a low elevation.

Danaus berenice Cram., race *strigosa* Bates

A single example was observed in Alamo Canyon, flying over a species of climbing milkweed (*Funastrum heterophyllum*) on which it undoubtedly feeds in this vicinity.

Euphydryas hermosa Wgt.

Two specimens, ♂ and ♀, were taken on successive days on the south side of Alamo Canyon just below the top of the ridge dividing it from the watershed to the south. Both were in perfect condition, indicating the height of the season, but no more specimens were encountered, although Dr. Tinkham reported a second male flying with the specimen captured by him. They were taken over a small bush composite, *Senecio*, the blossoms of which have been frequently noted as attractive to members of the genus. Dr. Tinkham also remarked upon their active flight.

Mr. W. N. Burdick (Bull. S. Cal. Acad. Sci., 38: 36–38, 1939) mentions this insect as occurring sparingly in the Santa Catalina Mountains northeast of Tucson, whereas *E. klotsi* Dos Passos is said to occur to the north and east in Oak Creek Canyon, Coconiño County, and on the south slope of Pinal Pass south of Globe.

The Ajo Mountain specimens have been compared with paratypes of *E. klotsi* in the collection of the Los Angeles Museum and with specimens in the writer's collection which are undoubtedly *klotsi* also, since they were taken at the type locality, Roosevelt Dam, although prior to the separation of *klotsi* from *hermosa*. There is a small but constant difference in the lunules of the under side of the secondaries. Even in the absence of comparative material from the Santa Catalina Mountains, it would seem that "Southern Arizona," the type locality mentioned by Wright for *hermosa*, would apply equally well to a *Euphydryas* from the Ajo Mountains, irrespective of whether or not these be identical. Consequently, the *Euphydryas* of the Ajo Mountains is referred to *hermosa* Wright, leaving *klotsi* to the more northern and eastern parts of Arizona.

Melitaea fulvia Edw.

A total of 7 ♂ and 5 ♀ specimens were taken of a *Melitaea* believed to be of the *leanira* group. Later comparison showed them to have Eastern rather than Western affinities, *M. fulvia* extending through eastern Arizona and New Mexico into Texas, whereas members of the *laenira* group, *M. wrighti* and *cerrita* of Southern California, apparently do not cross the Colorado River.

The butterflies were flying over buckwheat (*Eriogonum gasciculatum*), the pink blossoms of which were the only lure capable of arresting their rapid and erratic flight. Only two pairs of the specimens were in perfect condition, indicating that an earlier date, perhaps April 10–15, would find them at their best. One specimen was taken in the canyon bottom. The rest were found on the open mountainside at elevations of 3,000 feet or better and preferably on those shoulders having a southwestern exposure.

The larval food plant of these *Melitaeas* is undoubtedly the paint brush (*Castilleja*), of which an abundance was to be found among the buckwheat and verbena.

Anthanassa texana Edw.

A single example was observed by both Dr. Tinkham and the writer to alight in the canyon bottom. It however eluded capture.

Chlosyne californica Wgt.

A total of 6♂ and 2♀ were taken out of many more seen. All were flying over *Encelia farinosa,* which occurs on the hot, dry mountainside in company with the pale, yellow-flowered legume, *Corsetia microphylla.* But for the *Corsetia,* the association is much the same as that in which *Chlosyne californica* occurs in Chino or Whitewater Canyon, Riverside County, California.

The Ajo Mountain specimens are uniformly much darker than California specimens, and are larger than those taken near Palm Springs. Also, their relation to the *lacinia* complex is more apparent, although by this it is not meant to imply that they represent hybrid forms. By means of them, however, the existence of an isolated and distinct representative of the genus in Southern California is more readily understandable.

Asterocampa celtis Bdv. & Lec., race *antonia* Edw.

The Ajo Mountains falling within the range of the hackberry, it was to be expected that some member of the genus *Asterocampa* Rob., or *Chlorippe* Bdv., as it has formerly been known, would be encountered. Comparison of 4♂ specimens taken in Alamo Canyon with specimens in the collection of the Los Angeles Museum shows that they should be referred to the race *antonia* as above.

The butterflies fly rapidly up and down the canyon bottom, alighting only upon the rocks or on the pebbly sand, where they may be netted after much patient stalking. Three or four times as many were seen as could be taken, although later in the sea-

son they may not be so wild. The female is considerably larger than the male and much lighter in color. No females were taken, nor, so far as is known, were any seen.

Libythea bachmanii Kirt.

A single specimen was observed to alight in the moist sand of the canyon bottom.

Atlides halesus Hbn.

One larva was secured from mistletoe (*Phorodendron californica*) growing on desert ironwood at the mouth of Alamo Canyon. The specimen pupated a few days later on April 27 and emerged, a male, on May 11.

Leptotes marina Reak.

At least eight specimens were taken, including females. They were flying low over the few remaining water holes in Alamo Canyon and could be netted two and three at a time.

Philotes rita B. & McD.

One ♂ and 3 ♀ specimens of this tiny blue butterfly were taken over the wild buckwheat (*Eriogonum fasciculatum*) which is a dominant plant of the dry southern slopes of the Ajo Mountains. The locality is the same as that in which *Melitaea fulvia* flies, and the *Eriogonum* and *Castilleja*, together with the bright blue *Verbena gooddingii*, combine to make the mountainside attractive to insect visitors.

Lycaenopsis pseudargiolus Bdv. & Lec., race *cinerea* Edw., gen. aest. *arizonensis* Edw.

A single ♂ specimen of this early spring flier was taken in a canyon tributary to Alamo Canyon on the south side. As with *L. echo* Edw. in the mountains of Southern California, so in Southern Arizona *L. arizonensis* is one of the first butterflies to appear on the wing and its spring flight may be nearly over before other species make their appearance.

Pyrgus communis Grt., race *albescens* Ploetz

To avoid confusion, it should be mentioned that this is the same insect previously known to the writer, and to most lepidopterists, as *Urbanus tessellata occidentalis* Skin. Indeed, it is so designated in so recent a work as Comstock, "Butterflies of California."

A single ♂ specimen of this common and widely-distributed skipper was taken in Alamo Canyon.

Antigonus pulverulenta Feld.

Considered something of a rarity in California, this powdery skipper becomes common in Lower California and in Sonora, Mexico. It is therefore quite understandable that it should be found in territory which more or less links these localities.

A single specimen was netted in Alamo Canyon.

Pholisora ceos Edw.

A single ♂ of this small black skipper was taken in Alamo Canyon. At the time the writer was under the impression that it was *P. alpheus,* which occurs in the Colorado River bottom. However, close examination with a hand lens at the suggestion of Dr. John A. Comstock revealed that the head of the insect was covered with yellow hairs, an unmistakable characteristic of *ceos*. Specimens labeled *Bolla ceos* from the Baboquivari Mountains in the collection of the Los Angeles Museum compare nicely with the Ajo Mountain specimen. We have therefore a considerable westward extension of range for the diminutive insect.

Copaeodes aurantiaca Hew.

A total of six specimens of this golden skipper were obtained, mostly in the canyon bottom. *C. aurantiaca* was as numerous in the Ajo Mountains at this season as were all other hesperids combined. This is one species which apparently is quite constant in its markings, Ajo Mountain specimens showing no difference from those of the desert regions of Southern California, particularly those taken in the vicinity of Palm Springs, Riverside County.

Undescribed Species of Crane-flies from the Eastern United States and Canada (Dipt.: Tipulidae). Part VIII

By Charles P. Alexander, Massachusetts State College, Amherst, Massachusetts

The preceding part under this general title was published in Entomological News, vol. 52: 192–196; 1941. At this time I am describing two interesting species collected by Mr. P. W. Fattig in Georgia. These specimens were included in materials sent for identification to the United States National Museum and the types of the novelties are preserved in that institution. I am much indebted to Mr. Fattig and to Dr. Alan Stone for the privilege of examining these flies.

Tipula (Lunatipula) fattigiana new species

Belongs to the *bicornis* (*fascipennis*) group; male hypopygium with the tergite relatively tumid, at apex produced into two subpendulous, slightly flattened, dark-colored lobes; apex of the region of the basistyle roughened and toothed; dististyle with both the rostral portion and the outer basal lobe unusually slender and spiniform; eighth sternite sheathing, narrowed outwardly, at apex with three brushes of setae, the lateral pair longer and interspersed with a few stronger bristles.

♂. Length about 19 mm.; wing 19 mm.

Frontal prolongation of head brownish yellow; nasus lacking; palpi with basal segment yellow, the outer segments broken. Antennae broken. Head light brown, yellowish gray pruinose.

Pronotum brown. Mesonotum chiefly light testaceous brown, covered with a yellow pollen, the usual praescutal stripes apparently lacking or very poorly indicated (the thorax of the unique type is badly damaged by pinning). Pleura yellow, sparsely pruinose. Halteres brown, the base of stem narrowly yellow. Legs with the coxae yellow, sparsely pruinose; trochanters yellow; remainder of legs obscure yellow, the outer tarsal segments dark brown; claws (male) toothed. Wings relatively broad, strongly tinged with brown, the prearcular and

costal fields somewhat more yellow; stigma darker brown; obliterative area before cord very conspicuous, extending from before stigma through cell *1st* M_2, narrowed over the anterior cord, involving vein M_3 but scarcely entering cell M_3; no post-stigmal brightening; veins brownish yellow, paler in the obliterative portions. Venation: *Rs* nearly twice *m-cu*; cell *1st* M_2 small, pentagonal; basal section of M_3 and *m* almost in a straight line and virtually parallel with the basal section of M_{1+2}; cell M_1 a little more than twice its petiole; *m-cu* near extreme base of vein M_4.

Abdominal tergites brownish yellow, with a conspicuous median, dark brown stripe, very narrow on the more basal segments, broadened behind, vaguely interrupted by pale posterior borders to the segments; lateral tergal borders entirely pale; sternites obscure reddish yellow; hypopygium chiefly dark brown, the eighth sternite more brownish yellow. Male hypopygium large; ninth tergite widely separated from the sternite-basistyle by pale membrane; basistyle chiefly indicated by its ventral suture only. Ninth tergite relatively tumid, at central apex produced into two subpendulous, slightly flattened, darkened lobes that are provided with conspicuous white setae; viewed from above, these lobes are seen to lie close together, being separated only by a linear notch; tergite viewed from the side with its ventro-caudal portion produced into two more compressed-flattened black lobes that are subcircular in outline. Apical margin of basistyle roughened and toothed, the most conspicuous point being a dorsal flattened blade that terminates in an acute tooth. Dististyle with both the rostral portion and the outer basal lobe unusually slender, the latter spinous; style clothed with conspicuous erect white setae. Appendage of ninth sternite appearing as a conical spine, its tip acute, the dorsal margin fringed with long yellow setae; on the mesal aspect, these setae very long, directed mesad, their apices conspicuously crinkly. Eighth sternite sheathing, narrowed outwardly, at apex bearing three groups of setae, two lateral and one median, the former longer, the setae interspersed with a few still longer and stouter bristles; median brush shorter.

Habitat.—GEORGIA. *Holotype:* ♂, Atlanta, June 1, 1941 (P. W. Fattig); Collector's No. 6.

I am greatly pleased to dedicate this conspicuous fly to Mr. Fattig whose detailed collecting and published studies have added materially to our knowledge of the insect fauna of our southeastern states. The fly is most similar to *Tipula* (*Lunatipula*) *megaura* Doane, 1901, differing from this and all other members of the group by the structure of the male hypopygium, notably of the tergite, basistyle, and dististyle.

Limnophila (Eutonia) phorophragma new species

Allied to *alleni;* mesonotal praescutum with the disk deep cinnamon brown, with darker brown stripes; wings with a strong supernumerary crossvein in cell R_5, connecting posteriorly with vein M_1; abdomen (female) elongate, the intermediate segments longer than broad.

♀. Length about 29–36 mm.; wing 18.5–23 mm.; abdomen alone, about 22–28 mm.

Rostrum dark brown; palpi brownish black. Antennae with scape and pedicel brownish black, the flagellum abruptly obscure yellow, the outer two or three segments infuscated; basal flagellar segments subglobular to short-oval, the outer ones passing into elongate, with long conspicuous verticils. Head brown, variegated with pruinose patches, strongly narrowed behind.

Pronotum grayish, more fulvous dorsally, the mid-area deepening to brown. Mesonotal praescutum with the disk deep cinnamon brown, including the interspaces, the area variegated by darker lines, most distinct as intermediate stripes in front and as a median darkening at suture, the lateral borders of the discal area again deepening to brown; humeral and lateral praescutal borders gray, internally passing into orange adjoining the discal area; pseudosutural foveae castaneous; scutum cinnamon brown, each lobe on central and lateral portions variegated with darker brown, the latter a backward continuation of the lateral discal borders of praescutum; scutellum fulvous brown, the broad posterior border and a delicate median vitta darker brown; mediotergite in center fulvous, more infuscated and

slightly pruinose around the borders, in cases more uniformly brown; pleurotergite brown. Pleura whitish gray pruinose over a light brown to fulvous brown background, where the pruinosity is rubbed exposing much of the ground; darker brown areas on dorsopleural membrane and below and before the wing-root. Halters obscure yellow, the knob not darkened. Legs with the coxae light gray pruinose, weakly infuscated on outer faces; trochanters obscure yellow; femora obscure yellow, the tips broadly blackened, the amount subequal on all legs; fore legs with a further dark medial ring, broader but slightly less intense than the apex; tibiae yellow, tips narrowly blackened; tarsi obscure yellow, the outer segments brownish black. Wings chiefly fulvous, variegated with paler fulvous and brown areas; the dark pattern appears as large areas in bases of cells *R* and *M*, virtually confluent with a quadrate mark at origin of *Rs*; anterior cord and fork of R_{2+3+4}; cell *C* uniformly darkened; more restricted brown clouds along posterior cord, outer end of cell *1st* M_2, the supernumerary crossvein in cell R_5, at near midlength of cells *Cu* and *1st A*; centers of the more posterior cells and the axillary border even less distinctly clouded; stigma oval, pale yellow; veins yellow, darker in the clouded areas. Venation: A supernumerary crossvein in cell R_5, connecting vein R_5 at just beyond midlength with M_1, about its own length beyond the fork.

Abdomen elongate, as shown by the measurements, segments two to seven, inclusive, being longer than broad; tergites orange, with a nearly continuous brown median vitta beginning on the third tergite, extending through the seventh; very narrow lateral tergal darkenings; outer tergites more darkened and slightly pruinose; sternites light yellow, with three narrow longitudinal brown stripes, the median one interrupted at posterior border of the segments, the lateral pair more continuous; outer sternites slightly more pruinose. Ovipositor with cerci dark brown basally, paling to horn yellow outwardly.

Habitat.—GEORGIA. *Holotype:* ♀, Lakemont, Rabun Co., June 5, 1940, at light (P. W. Fattig). *Paratopotype:* ♀; in Alexander Collection. An additional female from the moun-

tains of western NORTH CAROLINA, collected by H. K. Morrison (Cornell University Collection); see Alexander, Amer. Midl. Nat., 26: 304–305; 1941, as *alleni* Johnson.

This species has been known to me from the fragmentary specimen from western North Carolina, mentioned above. The receipt of this further material indicates a distinct species which, while allied to *Limnophila* (*Eutonia*) *alleni* Johnson, 1909, is distinguished by the elongate abdomen, the supernumerary crossvein in cell R_5, and the coloration of the mesonotum. In *alleni,* the ground color of the praescutum is gray, strongly delimiting four dark brown stripes; there is no supernumerary crossvein in any cell of the wing, and abdominal segments three to six are wider than long, in conformance to the much shorter abdomen. The distribution of *alleni* as given by the author in the "Diptera of Connecticut," p. 390; 1943, is correct,—New Hampshire, Vermont, New York and Ohio. All records from the southeastern United States will presumably be found to refer to the present fly.

New Aphodius from Texas Gopher Burrows *

By O. L. CARTWRIGHT, South Carolina Agricultural Experiment Station, Clemson, South Carolina

Descriptions of six undescribed species of *Aphodius* together with brief notes on these and one previously known species are presented in the following. All specimens were collected by E. S. Ross and A. J. Kirn from the burrows of the pocket gopher, *Geomys breviceps atwateri* Merriam, 7½ miles south of Somerset, Texas (twenty miles south of San Antonio). Descriptions and data concerning other material collected in the burrows are presented by Mr. Ross in other papers † in this journal.

I am indebted to Mr. E. T. Cresson, Jr. of the Philadelphia Academy of Science, Mr. Nathan Banks of the Museum of

* Technical Contribution No. 117 from the South Carolina Agricultural Experiment Station, Clemson, South Carolina.

† Ent. News, 55: 57–61, 115–118. 1944.

Comparative Zoology at Harvard, and Mr. W. J. Brown of the Canadian National Museum for opinions and comparison of specimens with types in their respective collections. To Mr. E. S. Ross I am especially indebted and grateful for the privilege of examining the material and for his permission to describe the new species. To these gentlemen I wish to express my thanks.

Holotypes and allotypes of the new species will be deposited in the collection of the California Academy of Science in San Francisco, California. Paratypes will be placed in the collections of the California Academy, the Philadelphia Academy, Mr. Ross, and the writer.

Aphodius rossi new species

Holotype male.—Length 8 mm., width 3.75 mm. Moderately elongate, shining, reddish brown; antennae and underside a little paler. Head moderately convex, without trace of tubercles, smooth, minutely punctulate, especially on genae and occiput under medium magnification; clypeus broadly shallowly emarginate, broadly rounded each side, the edge narrowly reflexed, genae fimbriate, moderately prominent; eyes small and inconspicuous from above. Pronotum slightly less than two-thirds as long as wide, sides arcuate, narrowly margined, feebly explanate, angles rounded and obtuse, a broad shallow depression in posterior angles, base strongly lobed medially and without marginal line, surface with extremely minute scattered punctation, practically imperceptible over middle, and with moderately coarse and close punctures at sides and posterior angles. Elytra twice as long as pronotum, seven-ninths as wide as long, slightly narrower than thorax at base, sides feebly arcuate, disc finely, not deeply, striate, the striae closely punctate, intervals flat, smooth, impunctate. Mesosternum feebly carinate between coxae, surface closely shallowly coarsely punctate and alutaceous except for a small smooth area on each side near middle. Metasternum smooth at middle, alutaceous with moderate setigerous shallow punctures at sides, median line weakly impressed. Abdomen alutaceous, and with scattered

fine punctures bearing very fine hair. Anterior tibiae smooth in front, tridentate with moderately long subacute teeth, weakly crenulate above the teeth, the first tarsal joint shorter than the second, the spur heavy, subacute, decurved, nearly five times as long as wide, its greatest width about at middle. Middle femur finely pubescent along inner two-thirds of posterior margin, two or three coarse setigerous punctures at knee, otherwise smooth. Posterior femurs including trochanters with similar but less extensive fine hair. Normally shaped short spur of middle tibiae one-half length of the longer. Posterior tibiae fimbriate with unequal spinules, the first joint of the tarsus as long as next three together.

Allotype female.—Length 8.2 mm., width 4 mm. Similar to male except that the spurs of the anterior tibiae are not as heavy and their acute tips are bent rather sharply inward, the short spurs of the middle tibia are somewhat greater than half the length of the long spurs, and the middle and hind femurs lack the fine pubescence along the posterior edge.

Holotype, 22 November 1942, allotype 27 November 1942, Somerset, TEXAS (Ross and Kirn). One hundred thirty-two paratypes, 22 November 1942 to 10 January 1943, same locality and collectors, from nest chamber, refuse chamber and bait traps in burrows of *Geomys breviceps atwateri* Merriam. Paratypes vary from 6.75 to 8.2 mm. in length, 3.2 to 4 mm. in width.

Aphodius rossi is very similar to *Aphodius haldemani* Horn, but the thorax is not as strongly explanate, the coarse punctures of the pronotum are not as large, the femurs are not as densely hairy along the posterior margin in the male, and the male spurs of the anterior and middle tibiae are distinctly different. The anterior spur in *haldemani* is elongate triangular, broadest and truncate at the tip; the short spur of the middle tibia is less than half the length of the long spur, feebly curved, apex dilated, almost squarely truncate and with the inner angle produced inward.

Aphodius kirni new species

Holotype male.—Length 6.9 mm., width 3.3 mm. Moder-

ately elongate, shining, dark reddish-brown, under parts somewhat paler. Antennae rufotestaceous. Head moderately convex, obsoletely tuberculate each side, minutely punctate; clypeus broadly feebly emarginate, distinctly angulate each side, sides arcuate, edge narrowly reflexed, fimbriate; genae not prominent, very obtuse, evenely rather weakly arcuate from anterior edge of eye to clypeus. Pronotum one-third wider than long, sides feebly arcuate, fimbriate, not explanate, and converging to rather sharply rounded anterior angles, posterior angles obtusely rounded, the marginal line strong and extending inward about equally around anterior and posterior angles, base sinuate and without marginal line; surface rather closely minutely punctate throughout, scattered medium punctures each side about equally divided between the anterior and posterior angles. Elytra a little narrower than pronotum at base, about one-fourth longer than wide, twice as long as thorax, sides feebly arcuate, disc moderately deeply striate, the striae finely crenately punctate, third and fourth striae united at base, intervals feebly convex, impunctate. Mesosternum not carinate between coxae, surface alutaceous, with moderate punctures scattered medially, dense at edges. Metasternum smooth with extremely minute punctures at middle, moderate setigerous punctures anteriorly at the sides, median line weakly impressed except posterior sixth which is carinate; a series of moderately coarse setigerous punctures each side converge in form of a wide V at posterior coxae. Abdomen alutaceous, finely to moderately punctured, the punctures bearing fine to medium hair. Anterior tibiae smooth in front, tridentate, smooth above the teeth, the spur only slightly decurved, subequal to first two tarsal joints combined, flattened, somewhat lanceolate, less than a third as wide as long, the tip sharply rounded. Middle and posterior femurs smooth with a row of coarse setigerous punctures at knee. Short spur of middle tibiae not quite half as long as long spur, bluntly rounded apically and produced inwardly in a small sharp tooth. Posterior tibiae fringed with unequal spinules, the long spur, first joint of tarsi and next three joints combined all equal in length.

Allotype female.—Length 7.5 mm., width 3.75 mm. Similar

to male except that the spur of the anterior tibia is narrower, and the normally shaped short spur of middle tibia is slightly more than half the length of the long spur.

Holotype, Somerset, TEXAS, 12 December 1942 in bait trap (A. J. Kirn). Allotype, same locality, 6 January 1943 in refuse chamber (Ross and Kirn). Fifteen paratypes, 22 November to 10 January 1943, same locality and collectors, from nest chamber, refuse chamber and bait traps set in burrows; and two from light trap by an unknown collector 22 June 1937, Morris County, Texas. They vary from 6 mm. to 7.8 mm. in length, in width from 2.7 mm. to 3.75 mm. Viewed from certain angles some specimens appear to have an extremely fine basal line on pronotum at middle. The moderate punctures of the pronotum vary considerably in numbers but are usually not very numerous.

Aphodius kirni is closely allied to *Aphodius goffi* Cartwright but differs in the larger moderate punctures of the pronotum, in the lack of complete basal marginal line on the thorax, and in the hooked or toothed spur of the middle tibiae of the male. In *fucosus* Schmidt, also closely similar, the coarse punctures of the pronotum are still larger and more widely distributed, the genae are more prominent, and the elytral intervals show scattered fine punctures.

Aphodius acuminatus new species

Holotype male.—Length 5.6 mm., width 3 mm. Moderately elongate, shining, dark reddish brown with edge of clypeus, lateral margins of pronotum and elytra, sutural intervals of elytra, femurs, and abdomen paler. Antennae testaceous. Head only slightly convex, not tuberculate, vertex and occiput closely, finely punctate, the punctures becoming slightly less dense, finer, and finally obsolete over anterior third of clypeus. Clypeus widely moderately emarginate, rounded each side and arcuate to prominent nearly right-angled genae, the genae sloping away from the general plane of the clypeus at nearly forty-five degrees. Pronotum rectangular, seven-tenths as long as wide, sides with moderate beading, weakly arcuate, strongly ex-

planate with a deep depression in posterior angles, anterior angles widely obtusely rounded, posterior angles truncate and without marginal line, base strongly widely lobed medially, the lobe with fine marginal line; surface with mixed coarse, fine, and minute punctures, the evenly distributed fine punctures moderately close with interspersed very minute punctuation, the coarse punctures absent antero-medially, becoming quite dense laterally, especially toward posterior angles, changing gradually from very shallow laterally and in anterior angles to moderately deep basally near the posterior angles, and uniting above the laterally smooth deep depression to form longitudinal rugae posteriorly to extreme edge of posterior angles. Elytra about one-third longer than wide, more than twice as long as pronotum, humeri very obtuse, sides strongly arcuate and jointly extended to a sharply rounded apex, striae shallow and not deeply punctate, intervals weakly convex, finely alutaceous, and with moderately close minute punctures. Mesosternum weakly convex between coxae, alutaceous medially, closely shallowly coarsely punctate laterally. Mestasternum finely alutaceous, fine to moderate punctures medially, alutaceous sculpture more pronounced laterally with scattered setigerous punctures, fine dark longitudinal median line showing through lighter surface color. Abdomen with indistinct fine punctures, strongly alutaceous throughout. Anterior tibiae smooth in front, tridentate, the teeth subacute, not serrate above the teeth; spur nearly as long as apical tooth, decurved basally, external edge arcuate outwardly, inner edge obtusely subangulate, apex acute; first tarsal joint shorter than second. Middle and posterior femurs with three or four coarse well-separated setigerous punctures at knee, and a group of moderate hairy punctures on posterior edge near the trochanter, otherwise minutely punctate and very finely alutaceous throughout. Short spur of middle tibiae arcuate, less than half the length of long spur, bluntly rounded apically and produced inwardly in a small sharp tooth, long spur slender and slightly longer than first tarsal joint. Posterior tibiae fimbriate with unequal spinules, first tarsal joint shorter than next three combined.

Allotype female.—Length 6 mm., width 3 mm. Similar to male except that anterior tibial spur is slender, apically acute and noticeably decurved at tip, the spurs of the middle tibiae are slender and normal, the shorter being more than half the length of the longer, and the middle and posterior femurs lack the hairy punctures near the trochanter.

(*To be continued*)

Notes and News in Entomology

Under this heading we present from time to time short reviews, notes, news and comments on entomology throughout the world. Contributions from readers are solicited and will be acknowledge when used.

Parasite production by the New Jersey Department of Agriculture: From 1939 to 1942 the parasite laboratory of the Bureau of Plant Industry of the New Jersey Department of Agriculture cultured millions of *Neoaplectana glaseri,* the nematode parasite of the Japanese beetle grub, and introduced 563 colonies of this nematode over sections of New Jersey that had an appreciable beetle population. These colonies were introduced at 3½ mile intervals. As this colonization should be adequate if the nematode is adapted to become a factor in the natural control of the Japanese beetle, emphasis has now been shifted to the production of other insect parasites.

At present the fungus *Beauveria bassiana* is being investigated as an adult Japanese beetle pathogen; *Microplectron fuscipennis* is being reared and introduced in the field as a parasite of the European pine sawfly; and work has begun on the production of large numbers of *Macrocentrus ancylivorus,* the most important insect parasite of the Oriental fruit moth, which is so troublesome to peach growers. H. B. Weiss.

Gnorimoschema operculella (Zell.) in New Jersey (Lep.): During the summer of 1943 an outbreak of this insect, known as the potato tuber moth, occurred over the southern half of New Jersey and was particularly severe in Cumberland and Salem counties. In years past minor indications of the presence of

this insect had been noted in a few potato fields, but it was assumed that it would never be a pest in New Jersey because our usual climatic conditions and disposition of the potato crop did not favor its development. This assumption was wrong. This insect, which is a pest in warm, dry regions, developed in alarming numbers last summer when temperatures were high and precipitation was low or absent. It is believed that the establishment of this insect in New Jersey was hastened by the operations of Federal governmental agencies which purchased and stored southern potatoes in New Jersey and then dumped them as unfit for food. Some of these potatoes were found to be severely infested by tuber moths.

Although not welcomed by potato growers, the larvae of the potato tuber moth were found by the Citrus Experiment Station of Riverside, California, to be ideal insectary hosts for the mass production of *Macrocentrus ancylivorus,* the parasite of the Oriental fruit moth, and advantage is being taken of this in the production of these parasites in New Jersey. H. B. Weiss.

A classification of entomologists in 1764: In his book *Entomologia sistens insectorum tabulas systematicus,* Hafniae, 1764, Martin Thomas Brunnich, the Danish naturalist and professor at Copenhagen, supplied a classification of entomologists, which is herewith reproduced as a matter of interest. Although in 1764 there may have been some basis for the distinctions then made, these do not hold at the present time, and Brunnich's classification needs to be completely revised and modernized. However, his grouping, which follows, shows the varied interests of a comparatively small group of early entomologists and naturalists.

I. Entomologists.
  A. Collectors.
    1. Ancients or Fathers (Patres), such as Aristotle, Pliny, Dioscorides.
    2. Commentators, the same names as above.
    3. Ichnographers, or figurists, such as Goedart, Hoefnagel, Merian, Vallisnieri, Albin, Frisch.

4. Metamorphosists, such as Swammerdam.
5. Describers, such as Ray and Linnæus.
6. Monographists, such as Lister, Schoeffer, Clerk.
7. Curiosi, such as Catesby, Strom, Pontoppidan.
8. Museographists, such as Linnæus and Poda.
9. Topographers, such as Albin and Frisch.
10. Voyagers, such as Marcgrave, Rumphius, Sloane, Hasselquist, and Osbeck.

B. Methodists.
1. Philosophers, such as Swammerdam, Réaumur, De-Greer, and Linnæus.
2. Systematists, the same names as above.
3. Nomenclators.

II. Entomophilists.
1. Anatomists, such as Malpighi, Swammerdam, Leuwenhoeck, Lyonnet, etc.
2. Physicians, such as Dioscorides, Galen, Aldrovandus, Mathiolus, Glauber, Dale, etc.
3. Miscellanei, such as Bochart, Lesser, Derham, etc.

H. B. Weiss.

The Survival of the Fittest "ism": Seventy-six years ago, March 19, 1868, on the publication of Darwin's "The Variations of Animals and Plants Under Domestication," the following paragraph appeared in "The Nation":

"For critical examination in detail, Mr. Darwin's new book must be referred to the scientific journals and to cultivators and breeders. But whatever audience he may address, a wide circle of general readers is sure to attend the founder of a new *ism*, and the word Darwinism has become as familiar as Galvanism or Mormonism."

Apparently in that day long ago, the three *isms* were equally famous, but with the passing of the years, the sole survivor, at least in common English usage, is Darwinism. Evidently the "survival of the fittest" works as well for *isms* as for organism, and despite its ups and downs, Darwinism sings today as loudly and lustily as ever. Phil Rau.

Current Entomological Literature

COMPILED BY THE EDITORIAL STAFF.

Under the above head it is intended to note papers received at the Academy of Natural Sciences of Philadelphia and the University of Pennsylvania, pertaining to the Entomology of the Americas (North and South), including Arachnida and Myriopoda. Articles irrelevant to American entomology will not be noted; but contributions to anatomy, physiology and embryology of insects, however, whether relating to American or exotic species will be recorded.

This list gives references of the current or preceding year unless otherwise noted. Continued papers, with few exceptions, are recorded only at their first installment.

For records of Economic Literature, see the Experiment Station Record, Office of Experiment Stations, Washington. Also Review of Applied Entomology, Series A, London. For records of papers on Medical Entomology, see Review of Applied Entomology, Series B.

NOTE: The figures within brackets [ ] refer to the journal in which the paper appeared, as numbered in the List of Journals given at the end of the literature. The number of the volume, and in some cases, the part, heft, &c. is followed by a colon (:). References to papers containing new forms or names not so stated in titles are followed by (*); if containing keys are followed by (k); papers pertaining exclusively to Neotropical species, and not so indicated in the title, have the symbol (S).

Papers published in ENTOMOLOGICAL NEWS are not listed.

GENERAL—Ball, Elmer Darwin, obituary, [39] 26: 60–61. **Bronson, W. S.**—The grasshopper book. Harcourt, Brace & Co. N. Y. $1.75; 1943. **Declarations.**—On the need for new names to be clearly indicated as such on their first publication and on the need for avoiding the publication of names as new on more than one occasion (Decl. 6). On the need for quoting bibliographical or other references for all names cited in zoological works (Decl. 7). On the need for giving in the case of zoological journals a clear indication of the date of publication of each number or part (Decl. 8). [87] 1: 41–64. **Dice, L. R.**—The biotic provinces of N. Amer. Univ. Mich. Press. $1.75; 1943. **Eliot, N.**—Larval anthropomorphism. [9] 77: 22–27. **Hinton & Corbet.**—Common insect pests of stored food products. A guide to their identification. British Mus. (Nat. Hist.) Economic Ser. No. 15. 1943, price 1 s. **Lutz, F. E.,** obituary and bibliography. [6] 52: 63–73, ill. **McDunnough, J.**—Genotype tangles. [4] 76: 20. **McLaine, Leonard Septimus.**—Obituary by Keenan & Twinn. [4] 76: 1–4, photo and bibliography. **Metcalf & Patton.**—Fluorescence microscopy applied to entomology and allied fields. [Stain Technology] 19: 11–28, ill. **Michelbacher & Smith.**—Some natural factors limiting the abundance of the alfalfa butterfly. [Hilgardia] 15: 369–97. **Newell, Wilmon,** obituary. [39] 26: 53–4, ill. **Prout, Louis Beethoven,** obituary. [21] 56: 28. **Scuza-Araujo, H. C.**—Infeccao espontanea e experimental de hematofagos (Ixodideos, Triatomideos, Culicideos, Hirudineos, Pediculideos e Cimicideos) em leprosos. [111] 38: 447–84, ill. **Sheldon, Wil-**

liam George, obituary. [9] 77: 17–19, ill. **Smith, R. W.**—Observations on some parasites of some Canadian grasshoppers. [4] 76: 28–33. **Stern, Schaeffer & Spencer.**—The genetic basis of differences between two sps. of Drosophila. [90] 78: 183–87. **Travassos e Freitas.**—Relatorio de setima excursao cientifica do Inst. Oswaldo Cruz, realizada a zona da Estrada de Ferro Noroeste do Brasil. . . . [111] 38: 385–412.

ANATOMY, PHYSIOLOGY, MEDICAL.—Alexander, Kitchener & Briscoe.—The effect of waxes and inorganic powders on the transpiration of water through celluloid membranes. [Trans. Faraday Soc.] 40: 10–19. **Dreyfuss & Breuer.**—Chromosomes and sex determination in the parasitic hymenopteron Telenomus fariae. [Genetics] 29: 75–80. **Hovanitz, W.**—Genetic data on the two races of Colias chrysotheme in N. Amer. and on a white form occurring in each. [Genetics] 29: 1–30. The distribution of gene frequencies in wild populations of Colias. [Genetics] 29: 31–60. **Weiss, McCoy and Boyd.**—Group motor responses of adult and larval forms of insects to different wave-lengths of light. [6] 52: 27–43, ill.

ARACHNIDA AND MYRIOPODA—Hathaway, C. R.—Associacao entre Mallophaga e Hippoboscidae. [111] 38: 413–17, ill. **Nesbitt, H. H.**—Three new mites of the subfam. Rhizoglyphinae. [4] 76: 21–27, ill. **Wilder, V. P.**—"Children of the earth." Solpugids are strange spider-like creatures called children of the earth. [Nature Mag., Washington] 37: 207–209, ill.

THE SMALLER ORDERS.—Crutchfield & Hixson.—Food habits of several sps. of poultry lice with spec. ref. to blood consumption. [39] 26: 63–6. **Needham, J. G.**—Further studies on Neotropical Gomphine dragonflies. [1] 69: 171–224, ill. (*).

ORTHOPTERA—Bronson, W. S.—(See under general.) **Opinions.**—Twenty-one names in the Orthoptera added to the official list of generic names in zoology (no. 149). [87] 2: 145–60. **Smith, R. W.**—(See under general.)

HEMIPTERA—Drake & Hanis.—So. Amer. Aradidae in the Carnegie Mus. [An. Carnegie Mus.] 30: 39–43 (*). **Hathaway, C. R.**—Consideracoes sobre Cephisus siccifolius (Cercop). [111] 38: 443–46, ill. **Lent, H.**—Triatomideos da Guinana Holandesa, redescricao de Panstrongylus lignarius. Novo transmissor da doenca de Chargas na cidade do R. d. Janeiro, estudo dos gen. Belminus, Bolbodera e

des. de Parabelminus carioca n.g., n.sp. (Triatom). [111] 38: 485–96, ill; 497–516, ill. (S). **Marshall & Pickett.**—The present status of the apple mealybug, Phenacoccus aceris in Bri. Col. & Nova Scotia. [4] 76: 19. **Moore, G. A.**—A list of hemiptera taken at Hudson Heights, Quebec. [4] 76: 40–44.

LEPIDOPTERA—Brown, F. M.—Notes on mexican butterflies, II, Pieridae. [6] 52: 99–119. **Clench, H. K.**—Two n. subsps. of Everes comyntas. [6] 52: 59–61. **Forbes, W. T. M.**—Lepidoptera from W. Peru and Ecuador. [6] 52: 75–83 (k*). **Hovanitz, W.**—(See under physiology.) **Michelbacher & Smith.**—(See under general.) **Opinions.**—On the dates of publication of the several portions of Huebner's Verzeichniss bekannter Schmetterlinge, 1816–1826 (no. 150). [87] 2: 161–68. **Sperry, J. L.**—A revision of the genus Chlorosea Pack., with descr. of n. sps. (Geometrid). [4] 76: 33–39, ill. **Tinkham, E. R.**—Faunistic notes on the diurnal Lepidoptera of the big bend region of Trans-Pecos, Texas, with the description of a new Melitaea. [4] 76: 11–18, ill. **Watson, J. R.**—Melipotis acanthoides in Fla. [39] 26: 71.

DIPTERA—Alexander, C. P.—Records and descr. of neotropical crane-flies. [6] 52: 45–57. **Bequaert, J.**—The dipterous fam. Mydaidae in Canada. [4] 76: 44. **Brown, W. J.**—Some new and poorly known sps. of Coleop., II. [4] 76: 4–10. **Hathaway, C. R.**—(See under Smaller Orders.) **Hull, F. M.**—Some flies of the fam. Syrphilae in the Br. Museum. [75] (11) 11: 21–61 (2 sp. S). **Miller, D. D.**—Drosophila melanura, a new species of the melanica group. [6] 52: 85–97, ill. **Oliveira Castro, G. M.**—Ecologia de Anopheles gambiae. [111] 38: 517–34.

COLEOPTERA—Arnett, R. H., Jr.—A revision of the nearctic Silphini and Nicrophorini based upon the female genitalia. [6] 52: 1–25, ill. **Seevers, C. H.**—A new subf. of beetles parasitic on mammals (Staph.: Amblyopinae). [Zool. Ser., Field Mus. N. H.] 28: 155–72, ill. **Watson, J. R.**—Atropical book worm in Florida. (Neogastrallus librinocens) (Anobid). [39] 26: 61–3.

HYMENOPTERA—Hincks, W. D.—Note on the nomenclature of some microgasterine Braconidae, with ref. to the works of Haliday and Nees von Esenbeck, pub. in 1834. [21] 56: 19–20. **Michelbacher & Smith.**—(for l.h. and host relations of Apanteles flaviconchae see under general.) **Webb, A.**—Beekeeping for profit and pleasure. Macmillan Co., N. Y. $2.00; 1943.

LIST OF JOURNALS CITED

1.—Trans. Amer. Entom. Soc. 4.—Canadian Entomol. 6.—Jour. N. Y. Ent. Soc. 9.—The Entomologist, London. 19.—Bull. Brook. Entom. Soc. 21.—Entom. Record & Jour. Variation. 39.—Florida Entomologist. 75.—Annals & Mag. Nat. Hist. 87.—Opinions and Declarations, Nat. Comm. Zool. Nomen. 90.—American Nat. 111.—Mem. Inst. Oswaldo Cruz.

EXCHANGES

This column is intended only for wants and exchanges, not for advertisements of goods for sale or services rendered. Notices not exceeding three lines free to subscribers.

These notices are continued as long as our limited space will allow; the new ones are added at the end of the column, and, only when necessary those at the top (being longest in) are discontinued.

Wanted—Specimens of the genus Calendra (Sphenophorus) from North America. Will exchange Eastern U. S. Calendra or other Coleoptera for desired species. R. C. Casselberry, 302 Lincoln Avenue, Lansdowne, Penna.

Coccinellidae wanted from all parts of the world, especially South and Central America. Buy or exchange. G. H. Dieke, 1101 Argonne Drive, Baltimore, Md.

Coleoptera—Will exchange mounted and labeled specimens from North America. All groups except Rhynchophora. G. P. Mackenzie, 1284 Sherwood Road, San Marino, Calif.

Lepidoptera—Should like to hear from collectors interested in species from central Alberta and Saskatchewan. Would collect other Orders. Paul F. Bruggemann, R. R. 1, Furness, Sask., Canada.

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